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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/757,203

01/14/2004

Kuo-Chi Tu

TS03-265

3555

47390

7590

01/13/2005

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EXAMINER

WILSON, SCOTT R

ART UNIT

PAPER NUMBER

2826

DATE MAILED: 01/13/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/757,203

Applicant(s)

TU, KUO-CHI

Examiner

Scott R. Wilson

Art Unit

2826

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 26 November 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-32 is/are pending in the application.
- 4a) Of the above claim(s) 1-18 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 19-23 and 25-27 is/are rejected.
- 7) ☒ Claim(s) 24 and 28-32 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 14 January 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date <u>4/14/04</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Election/Restrictions

Applicant's election without traverse of claims 19-32 in the response filed 20 October 2004 is acknowledged.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claim 19 recites the limitation "said first hard-mask layer" in line 5. There is insufficient antecedent basis for this limitation in the claim.

Claim 20 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 20, lines 2 and 3 recite "a planar second hard-mask layer over said second conducting and said second lard-mask layer". It is believed that the word "layer" should be inserted after "conducting". In addition, claim 20 also recites "a third conducting layer patterned over gate electrodes on said substrate and over said RAM capacitors." The specification, on page 14, second paragraph, and in Figure 11A, indicates that the third conducting layer is patterned to form the gate electrodes (32) on the gate oxide (30). Appropriate acknowledgement and correction are required. For the remainder of this action, gate electrodes (32) of Figure 11A will be taken to be comprised of the third conducting layer.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 19, 21-23 and 25-27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Furukawa et al. in view of Sneh. As to claim 19, Furukawa et al., Figure 7 and col. 3, lines 63-65, discloses a random access memory (RAM) capacitor in a shallow trench isolation comprised of: a substrate (31) having said shallow trench isolation (33) surrounding active device areas, a pad oxide layer (35)(col. 4, line 12) on said substrate, recesses (39) in a first hard-mask layer (45), said pad oxide layer and partially within said shallow trench isolation and said recesses extending under said first hard-mask layer to said substrate and said recesses having a bottle-shape. Furukawa et al. does not disclose expressly a conformal first conducting layer in said recesses for capacitor bottom electrodes; an interelectrode dielectric layer over said bottom electrodes, or a conformal second conducting layer that fills said recesses sufficiently thick to form a planar surface over said recesses. Sneh, Figure 14, discloses in paragraph [0093], a conformal first conducting layer (16) in a recess for a capacitor bottom electrodes; in paragraph [0105], an interelectrode dielectric layer (43) over said bottom electrodes, and in paragraph [0108], a conformal second conducting layer (30) that fills said recess sufficiently thick to form a planar surface over said recess. At the time of invention, it would have been obvious to a person of ordinary skill in the art to form the capacitor of Sneh in the STI structure of Furukawa et al. The motivation for doing so would have been to form a capacitor in a DRAM cell with a substantially enhanced capacitive density (Sneh, Abstract). Therefore, it would have been obvious to combine Sneh with Furukawa et al. to obtain the invention as specified in claim 19.

As to claim 21, Furukawa et al., col. 3, line 51, discloses that the substrate (31) is formed from silicon.

As to claim 22, Furukawa et al. does not expressly discloses a thickness of the pad oxide layer (35), however, it is known in the art (Tzeng et al., col. 3, lines 64-66) that a pad oxide layer may be formed with a thickness of between about 90 to 150 angstroms.

As to claim 23, Sneh, paragraph [0093] discloses tungsten as a possible first conducting layer (16), however it is known in the art that TiN may also be used (Fazan et al., col. 3, lines 55-56).

As to claim 25, Sneh, paragraph [0097] discloses an example of the first conducting layer having a thickness of 50 angstroms, which is within the scope of being about 100 angstroms.

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As to claim 26, Sneh does not expressly disclose an ONO inter-electrode dielectric layer, but such layers are known in the art, for example, Leung et al., Figure 4E, col. 10, lines 66-67 and col. 11, lines 4-7, which discloses an ONO capacitor dielectric structure with thickness about 110 angstroms.

As to claim 27, Sneh, does not expressly disclose the material for the second conducting layer (30), however it is known in the art that TiN may be used (Fazan et al., col. 3, lines 55-56), akin to the first conducting layer (16).

Allowable Subject Matter

Claims 28-32 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. No prior art discloses the claimed invention with a second planar hard mask layer formed over the second conducting layer of the capacitor, along with sidewall spacers.

Double Patenting

Claim 24 is objected to under 37 CFR 1.75 as being a substantial duplicate of claim 23. When two claims in an application are duplicates or else are so close in content that they both cover the same thing, despite a slight difference in wording, it is proper after allowing one claim to object to the other as being a substantial duplicate of the allowed claim. See MPEP § 706.03(k).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Scott R. Wilson whose telephone number is 571-272-1925. The examiner can normally be reached on M-F 8:30 - 4:30 Eastern.

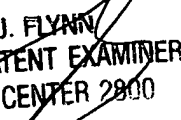
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nathan Flynn can be reached on 571-272-1915. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

srw

January 6, 2005


NATHAN J. FLYNN
SUPERVISORY PATENT EXAMINER
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